

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

REMARKS/ARGUMENTS

Reconsideration of the present application, as amended, is respectfully requested.

The February 4, 2005 Office Action and the Examiner's comments have been carefully considered. In response, claims are cancelled and added, and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

ELECTION/RESTRICTION

In the Office Action, the Examiner repeats the previous restriction requirement and acknowledges Applicants' provisional election of Group I, claims 1-16. Applicants affirm the election of Group I, claims 1-16 for further prosecution on the merits. Applicants also acknowledge that claims 17-31 are withdrawn from further consideration by the Examiner as being drawn to a non-elected invention. Applicants have cancelled non-elected claims 17-31, without prejudice. Claims 17-31 may be the subject of a divisional application.

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

DELETION OF INVENTOR

In the Office Action the Examiner reminds Applicants that upon the cancellation of claims directed to a non-elected invention, the inventorship must be amended to be in compliance with 37 CFR 1.48(b). In response, Applicants have submitted an Amendment with this response to amend the present inventorship to delete a correctly named original inventor (Kenji Kobayashi), who is not an inventor of the invention now being claimed. The appropriate fee as required under 37 CFR 1.17(i) is also enclosed with the Amendment.

PRIOR ART REJECTIONS

In the Office Action claims 1-3 are rejected under 35 USC 103(a) as being unpatentable over USP 5,516,621 (Tsuda et al.) in view of USP 4,814,808 (Sangyoji et al.). Claims 4-16 are rejected under 35 USC 103(a) as being unpatentable over USP 4,884,501 (Izaki et al.) in view of USP 5,185,226 (Grosso et al.) and Sangyoji et al.

In response, claims 1-16 are cancelled and new claims 32-45 are added.

Tsuda et al., Izaki et al., Grosso et al. and Sangyoji et al. may disclose some of the structural elements of original claims 1-4. However, new independent claims 32-35 are patentable

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

over Tsuda et al., Izaki et al., Grosso et al., and Sangyoji et al., when taken either alone under 35 USC 102 or in combination under 35 USC 103.

Of particular note in new independent claims 32-35 is that the microcapsule toner used in the present color image forming method or the present color image forming apparatus includes a plurality of kinds of smaller microcapsules dispersed and encapsulated in larger microcapsules, where (1) the plurality of kinds of smaller microcapsules are different in at least one of outer diameter, shell thickness, and material so as to correspond to respective predetermined resonant frequencies, and (2) each smaller microcapsule contains an air bubble. (See claim 32, lines 4-8; claim 33, lines 4-8; claim 34, lines 4-8; and claim 35, lines 3-8.)

It should also be noted that in the color image forming method or the color image forming apparatus of the present claimed invention, (3) the toner image, the toner image pattern, or the voltage level pattern to be formed on the image carrier is formed in accordance with ORed items of image information about respective colors. (See claim 32, lines 14-22; claim 33, lines 18-20; claim 34, lines 18-20; claim 35, lines 16-22.)

Moreover, in the color image forming method or the present color image forming apparatus of the present claimed invention,

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

(4) the ultrasonic waves to be irradiated to the toner image formed on the image carrier have different predetermined resonant frequencies corresponding to respective color component items of the image information, and are focused within the width of one pixel in the primary scan direction. (See claim 32, lines 25-29; claim 37, lines 23-27; claim 34, lines 25-29; claim 35, lines 26-30.)

According to the color image forming method or color image forming apparatus of new independent claims 32-35, with the use of the resonant frequencies of ultrasonic waves, the larger microcapsules encapsulating the plurality of kinds of smaller microcapsules having a suitably selected capsule diameter, capsule wall thickness, or material to correspond to the resonant frequencies, and the smaller microcapsules containing an air bubble, it is possible to efficiently transmit ultrasonic vibrations without any influence by acoustic impedance. By providing the predetermined ultrasonic impulse, it is possible to break the smaller microcapsules to cause the contained coloring agent to mix and react with a developing agent. Therefore, a novel method and apparatus are provided which are capable of easily forming a color image on generally available paper having a quick response ability, despite their simple configuration.

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

The present claimed invention can be realized by a conventional electrophotographic printer, by using the microcapsule toner of the present claimed invention as a developing agent, electrostatically attracting the microcapsule toner to an electrostatic latent image formed on the image carrier such as a photoconductor drum or the like, irradiating the latent image with ultrasonic waves in accordance with image information to cause selective color emission from the smaller microcapsules, transferring the capsule toner to recording paper and thermally fixing the colored image on the paper.

Tsuda et al. and Grosso et al. teach the use of multinuclear microcapsules or capsule toner in color image formation.

Izaki et al. disclose an apparatus using pressure to develop microcapsules.

Tsuda et al., Grosso et al. and Izaki et al. merely disclose an image forming method and apparatus using photosensitive pressure-sensitive capsules, but does not disclose, teach or suggest the microcapsule as specifically recited in the presently amended claims. That is, the capsules disclosed in the cited references are formed of, for example, a coloring member and a photosensitive member which is hardened (or softened) by a specific light (having a specific wavelength), because these inventions are based on a technical idea that, for example, a

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

background image is hardened by light and unhardened portions are broken by pressure to emit color.

The present claimed invention as defined by new independent claims 32-35 is patentable over the cited references because the references do not disclose, teach or suggest that the microcapsule toner includes a plurality of kinds of smaller microcapsules dispersed and encapsulated in larger microcapsules, wherein the plurality of kinds of smaller microcapsules are different in at least one of outer diameter, shell thickness, and material so as to correspond to respective predetermined resonant frequencies, and each smaller microcapsule contains an air bubble (see claim 32, lines 4-8; claim 33, lines 4-8; claim 34, lines 4-8; and claim 35, lines 3-8). The use of smaller microcapsules which contain an air bubble enables easier resonation of the smaller microcapsules in relation to the electronic waves. There is no disclosure, teaching or suggestion of this benefit in the cited references.

Sangyoji et al. disclose the use of ultrasonic waves in the development of pressure-sensitive microcapsules. However, Sangyoji et al. is directed to the development of photosensitive and pressure-sensitive paper that is not meant to be used with toner (see column 1 lines 41 to 45 of Sangyoji et al.). Therefore, Sangyoji et al. is incompatible with the color image

Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

forming method of the present invention for forming a toner image on the image carrier.

Sangyoji et al. is intended for photosensitive pressure-sensitive microcapsules, and the ultrasonic irradiation is performed in a uniform manner. Therefore, Sangyoji et al. do not teach the capsule having the above-described features, and clearly has no relevance to the toner image, the toner image pattern or the voltage level pattern to be formed on the image carrier which is formed in accordance with ORed items or image information about respective colors, or the ultrasonic waves to be irradiated to the toner image formed on the image carrier have different predetermined resonant frequencies corresponding to respective color component items of the image formation, and are focused within the width of one pixel in the primary scanned direction (see claim 32, lines 14-22 and 25-29; claim 33, lines 18-20 and 23-27; claim 34, lines 18-20 and 25-29; and claim 35, lines 16-22 and 26-30).

That is, according to the color image forming method or color image forming apparatus of new independent claims 32-35, the ultrasonic waves irradiated for breaking the smaller microcapsules to emit color are waves that are focused within the width of one pixel in the primary scan direction, and are therefore clearly different in the manner of irradiation from

Appln. No. 10/517,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

Sangyoji et al. where ultrasonic waves are irradiated in a uniform manner.

That is, independent claims 32-35 are patentable over the cited references under 35 USC 102 as well as 35 USC 103 for reasons, inter alia, set forth above.

Dependent claims 36-45 are either directly or indirectly dependent on claim 35 and are patentable over the cited references in view of their dependence on claim 35 and because the references do not disclose, teach or suggest each of the limitations set forth in claims 36-45.

CLAIM FEE

It is respectfully submitted that no additional fees are due for the presentation of claims 32-45 because the highest number of independent and total claims for which payment was previously made was six (6) and thirty one (31) respectively, and the present application as amended includes four (4) independent claims and fourteen (14) total claims. However, if any additional fees are due, please charge our Deposit Account No. 06-1378 for such sum.

* * * * *

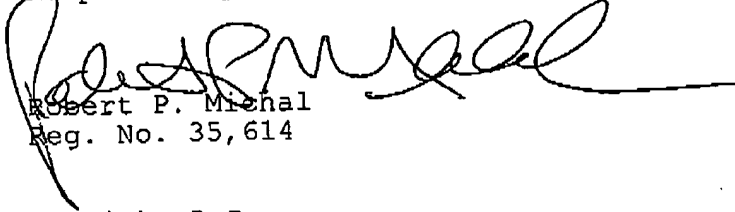
Appln. No. 10/617,243
Amendment dated March 30, 2005
Reply to Office Action of February 4, 2005

Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,



Robert P. Michal
Reg. No. 35,614

Frishauf, Holtz, Goodman & Chick, P.C.
767 Third Avenue - 25th Floor
New York, New York 10017-2032
Tel. (212) 319-4900
Fax (212) 319-5101
RPM/ms

Encl: Amendment and Request Deleting
Correctly Name Original Person
Who Is Not Inventor of Invention
Now Being Claimed (37 CFR 1.48(b))